Padilla Bay (PDB) **NERR Water Quality Metadata**
January – December 2024
Latest Update April 10th, 2025

Note: This is a provisional metadata document; it has not been authenticated as of its download date. Contents of this document are subject to change throughout the QAQC process and it should not be considered a final record of data documentation until that process is complete. Contact the CDMO (cdmosupport@baruch.sc.edu) or reserve with any additional questions.

I. Data Set and Research Descriptors

1) Principal investigator(s) and contact persons –

Address: Padilla Bay NERR
10441 Bayview-Edison Road
Mount Vernon, WA 98273-9668

Sylvia Yang, Research Coordinator
Phone: (360) 428- 1089
Email: syan461@ecy.wa.gov

Nicole Burnett, Environmental Specialist
Phone: (360) 428-1097
Email: nbur461@ecy.wa.gov

2) Entry verification –

Deployment data are uploaded from the YSI data logger to a personal computer with Windows 7 or newer operating system. Files are exported from EcoWatch in a comma-delimited format (.CDF), EcoWatch Lite in a comma separated file (CSV) or KOR Software in a comma separated file (CSV) and uploaded to the CDMO where they undergo automated primary QAQC; automated Depth/Level corrections for changes in barometric pressure (cDepth or cLevel parameters); and become part of the CDMO's online provisional database. All pre- and post-deployment data are removed from the file prior to upload. During primary QAQC, data are flagged if they are missing or out of sensor range. The edited file is then returned to the reserve for secondary QAQC where it is opened in Microsoft Excel and processed using the CDMO's NERRQAQC Excel macro. The macro inserts station codes, creates metadata worksheets for flagged data and summary statistics, and graphs the data for review. It allows the user to apply QAQC flags and codes to the data, remove any overlapping deployment data, append files, and export the resulting data file for upload to the CDMO. Upload after secondary QAQC results in ingestion into the database as provisional plus data, recalculation of cDepth or cLevel parameters, and finally tertiary QAQC by the CDMO and assimilation into the CDMO's authoritative online database. Where deployment overlap occurs between files, the data produced by the newly calibrated sonde is generally accepted as being the most accurate. For more information on QAQC flags and codes, see Sections 11 and 12.

Nicole Burnett performs the data management and QAQC procedures at Padilla Bay. Edited and raw files are archived on a PC hard drive at Padilla Bay NERR as well as on the Padilla Bay server. The Padilla Bay server is backed up as per Washington Department of Ecology protocols with backup files created weekly and monthly.

3) Research objectives –

The Bay View Channel site has been set out to detect and monitor short-term variability and long-term changes in the southern part of Padilla Bay.

The Ploeg Channel site has been set out to detect and monitor short-term variability and long-term change in the northern part of Padilla Bay for comparison and contrast with water quality in the southern part of the bay.

The Joe Leary Tidegate site replaces the Joe Leary Estuary site and resumes collection on the freshwater side of the tidegate similar to Joe Leary Slough. Because of major changes to the tidegate structure and the long period between the 2 collections on the freshwater side they are considered 2 sites.

The Gong Surface site (both surface and deep) have been set in the deep-water strait west of the northern part of Padilla Bay to monitor short-term variability and long-term change in the waters that are a source for the tidal waters flowing into Padilla Bay.

These four sites are set up to provide an indication of the salinity gradient from Joe Leary Estuary (freshwater) through Bayview Channel (downstream of freshwater sources from Indian and No Name Sloughs) to Ploeg Channel (remote from freshwater sources but in a tidal channel) to Gong on the marine end of the gradient. Measurements are taken every 15 minutes at the Bayview, Ploeg, Gong and Joe Leary Estuary sites, unless otherwise noted.

The Gong Deep site has been set out as a means to have water quality information at fixed-depth pair to Gong (surface), provide information for nutrients collected at this site and depth, and provide context to other SWMP sites that might be influenced by intrusion of deep-water entering Padilla Bay.

The Joe Leary Slough (decommissioned) site was set at the mouth of the slough to measure the effects of tidal "closure" of the tide gates on water in the slough and to detect long-term changes in water quality in the slough associated with implementation of a non-point source pollution watershed action plan.

The Joe Leary Estuary (decommissioned) site has been set out to improve data collection in Joe Leary Slough and replaces the Joe Leary Slough site. Although it is outside the tide gates (on the marine side of the tide gates) it provides data on the freshwater coming out of the tide gates when they are open.

4) Research methods –

Site name	Bayview
Site infrastructure description	An 4in diameter ABS pipe attached to an 9in galvanized steel piling with multiple hose clamps along the length of the pipe.
Surveying equipment	Trimble R8 GNSS base and rover antennae
Survey monument used	**PBNERR** 48.49326 N 122.48230 W (N48°29'35.72410" W122°28'56.26276", -8.282 m Orthometric height)
Survey occupation date	Original Rapid static GPS Surveys on Dec 18, 2003 and Dec 19, 2003. Second order level procedures using tape, bar code rod and digital level on Dec 9, 10,11, 12, 2003. Done by Semrau Engineering and Surveying, Mt. Vernon, WA. And OPUS Solution using 4 hour occupations May 27, 2017
Survey occupation duration	RTK for >=180 epochs with repeated observations in multiple years
Ellipsoid height	-20.111 m
"Quick Check" marker for deployment tube	The steel piling has a hose clamp to mark the top of the deployment tube.
"Quick Check" for sonde being deployed at the same location	The deployment line is marked so that when the sonde is deployed, and the line is taught the mark lines up with the top of the deployment tube.

Annual resurveying	2010, 2011, 2013, 2014, 2015

Site name	Gong Deep
Site infrastructure description	N 4 in, 1m long ABS pipe is attached to a line with 2 shackles. The line is attached a small helical anchor which has a 10m tag line that attaches to the main Gong Buoy mooring.
Surveying equipment	NA
Survey monument used	NA
Survey occupation date	NA
Survey occupation duration	NA
Ellipsoid height	NA
"Quick Check" marker for deployment tube	Visual confirmation that the tube is still attached to the line at the 2 locations.
"Quick Check" for sonde being deployed at the same location	Visual confirmation that the sonde is resting on the bolt at the bottom of the deployment tub.
Annual resurveying	NA

Site name	Gong Surface
Site infrastructure description	The buoy is attached to a helical anchor with 80ft of 1in double nylon line and 10ft of chain. The deployment tube sits in a metal "cage" that runs through the top of the buoy.
Surveying equipment	NA
Survey monument used	NA
Survey occupation date	NA
Survey occupation duration	NA
Ellipsoid height	NA
"Quick Check" marker for deployment tube	Visual inspection of the steel "cage" mounts on top of the buoy.
"Quick Check" for sonde being deployed at the same location	The deployment line is marked so that when the sonde is deployed, and the line is taught the mark lines up with the top of the deployment tube.
Annual resurveying	NA

Site name	Joe Leary Tidegate
Site infrastructure description	Two pipe brackets, epoxied into the concrete tide gate hold the 4in ABS in place.

Surveying equipment	*(model, specs, etc.)* Coming soon
Survey monument used	Coming soon
Survey occupation date	Coming soon
Survey occupation duration	Coming soon
Ellipsoid height	Coming soon
"Quick Check" marker for deployment tube	There is a hose clamp on the deployment tube that lines up with the top of the tide gate.
"Quick Check" for sonde being deployed at the same location	The deployment line is marked so that when the sonde is deployed, and the line is taught the mark lines up with the top of the deployment tube.
Annual resurveying	Coming soon *(include dates of surveys and verifications)*

Site name	Ploeg
Site infrastructure description	An 4in diameter ABS pipe attached to an 9in galvanized steel piling with multiple hose clamps along the length of the pipe.
Surveying equipment	Trimble R8 GNSS base and rover antennae
Survey monument used	**PBNERR** 48.49326 N 122.48230 W (N48°29'35.72410" W122°28'56.26276", -8.282 m Orthometric height)
Survey occupation date	Original Rapid static GPS Surveys on Dec 18, 2003 and Dec 19, 2003. Second order level procedures using tape, bar code rod and digital level on Dec 9, 10,11, 12, 2003. Done by Semrau Engineering and Surveying, Mt. Vernon, WA. And OPUS Solution using 4 hour occupations May 27, 2017
Survey occupation duration	RTK for >=180 epochs with repeated observations in multiple years
Ellipsoid height	-19.211 m
"Quick Check" marker for deployment tube	The steel piling has a hose clamp to mark the top of the deployment tube.
"Quick Check" for sonde being deployed at the same location	The deployment line is marked so that when the sonde is deployed, and the line is taught the mark lines up with the top of the deployment tube.
Annual resurveying	2010, 2011, 2013, 2014, 2015

YSI 6600 sondes were deployed in Joe Leary Estuary which is near the tide gates on Joe Leary Slough but on the marine side starting March 25, 2009. The sonde is housed in an ABS pipe. The ABS is attached to a wood piling and is positioned so that the sonde is 0.1 m above the bottom on the sloping edge of the slough.

YSI EXO 2 were deployed on the newly renovated Joe Leary Tidegate. The sonde is housed in an ABS pipe. The ABS is attached to the southwest concrete wall on the freshwater side of the tidegate. The sonde is positioned is approximately 0.2 m above the bottom. Just below the sonde is a layer of sedment and then the concrete base of the tidegate.

YSI 6600 and EXO 2 (beginning 9/6/19) sondes were deployed in Padilla Bay in a tributary of Bayview Channel. They were deployed using the same design as that in Joe Leary Estuary, except that the ABS pipe was attached to a 9 inch galvanized

steel pile (installed 1/16/2008). The bottom of the sonde sensor guard sits 0.20 m (measured 3/8/12) above the bottom along the sloping edge of a small channel draining the surrounding intertidal flats. From this point on the datalogger has remained at the same depth, however, the distance between the bottom of the sensor guard and the sediment surface changes frequently depending on the channel dynamics. (From the beginning of the site until 1/16/2008 the depth of the datalogger was -1.1 m below MLLW.) This site often collects large mats of debris (eelgrass, kelp etc), and while all attempts to monitor and remove the debris mats are made this should be taken into account when interpreting the data. EXO's instead of a 6600s were used to collect data at Ploeg beginning 9/6/19. In order, to maintain a consistent depth reading despite the change in location of depth sensor a copper spacer was added to the bottom of the EXO guard. Elevation measurements are made by using a leveling a bracket to hold the RTK to a mark on the pole and calculated using the distance between the depth sensor and the mark on the pole.

YSI 6600 and EXO 2 (beginning 5/18/18) sondes were deployed in Ploeg Channel using the same design as that in Bayview Channel. From the beginning of the site until 1/16/2008 the depth of the datalogger was –1.33 m (depth below MLLW) and 0.33 m above the bottom along the sloping edge of a channel draining the surrounding intertidal flats. 1/16/2008 the site was changed and a 8" diameter steel pile was driven into the sediment and serves as the stable structure for the attachment of the ABS pipe. Sometime between 11/23/10 and 12/30/10 the ABS pipe began to fail and then completely failed becoming detached from the steel pile. The ABS pipe was reinstalled in 1/11/2011 with the bottom of the sonde 0.25 m above the bottom. On 3/8/12 the ABS pipe was adjusted so the bottom of the sonde is 0.50 m above the bottom. From 3/8/12 to present the datalogger has remained at the same depth, however, the distance between the bottom of the sensor guard and the sediment surface changes frequently depending on the channel dynamics. This site often collects large mats of debris (eelgrass, kelp etc.), and while all attempts to monitor and remove the debris mats are made this should be taken into account when interpreting the data. EXO's instead of a 6600s were used to collect data at Ploeg beginning 5/18/18. In order, to maintain a consistent depth reading despite the change in location of depth sensor a copper spacer was added to the bottom of the EXO guard. Elevation measurements are made by using a leveling a bracket to hold the RTK to a mark on the pole and calculated using the distance between the depth sensor and the mark on the pole.

YSI 6600 and EXO 2 (beginning 11/19/14) sondes were deployed at the Gong Surface site with the sonde housing tube located on the side of a 54-inch diameter oceanographic data buoy with an instrument tower and extends into the water so the sonde sits 1 meter below the surface of the water. (Note: the depth data thus reflects the depth the sonde is under the surface of the water and prone to wave action on the buoy unlike the stable platform of the other sites.) The portion of sonde housing tube around the sensors (to bottom 8" of the tube) has ten 1 ½" holes and the bottom of tube is open to the water. This allows water to circulate around the probes while still having a substantial amount of pipe intact to protect the sonde and sensors. The buoy is anchored to the bottom (~ 18 m) with a 13 ft helical anchor.

YSI EXO 2 sondes were deployed at Gong Deep with the sonde housing tube located 1m off the bottom of the Gong site. The sonde housing tube is floating and is attached to a helical anchor. This helical anchor is 10m north of and attached via a tag line to the helical anchor mooring the Gong Surface buoy. Because the sondes are deployed by divers, which requires suitable weather and relatively calm surface conditions, it can be challenging to keep deployment lengths between the requisite 30 to 45 days. An analysis of post calibration check values and the difference between the 15-minute readings of the end of one deployment to the beginning of the next concluded that deployment lengths could reliably be extended up to 100 days and still maintain a high level of data quality.

In all cases, measurements of temperature, specific conductivity, and salinity, percent saturation of dissolved oxygen, dissolved oxygen mg/L, depth, pH and turbidity are recorded every 15 minutes. Chlorophyll *a* is also recorded at Gong Surface. At the end of each deployment, the YSI 6600 or EXO 2 is brought back into the laboratory for downloading, cleaning, and recalibration. Before final cleaning and recalibration, a post-deployment check is done that consists of recording sensor readings in the standard solutions. The results of these checks are used to help evaluate the validity of the logged data.

All calibrations are conducted according to the protocols in the NERRS SWMP EXO SOP v2.2. For the conductivity calibration a conductivity standard of 50 mS/cm was used. The pH calibration is a 2-point calibration using standard buffer solutions with a pH of 7 and 10. ROX oxygen probes only require membrane maintenance every two years and are calibrated in saturated water using 2 air stones to obtained 100% saturation. A 2-point calibration is used for the turbidity probe and the wiper pad is changed prior to each deployment. The standards used are distilled/deionized water for zero and 124 NTU YSI turbidity standard from YSI. The chlorophyll sensor is calibrated with distilled water for a zero point and rhodamine for a second point as described in the manual.

The following QA/QC procedures were used if it was determined that the turbidity values were not from an actual turbidity event (unless it was decided that the data should be marked in another way). All data over 100 NTU were evaluated to determine if the data were from a real event. If they were from a real event they were marked as 0 CTS (except at Joe Leary Estuary because the turbidity frequently is over 100 NTU). If the data were determined to be caused by other factors, they were either marked as 1 or -3 and codes added. Other anomalous turbidity values below 100 NTU were also examined for validity. Similarly, beginning in 2019 chlorophyll data were QA/QC'd with the following procedures. All chlorophyll values 50 ug/L or greater were marked as 1 SCS unless determined that the data was from a real event. Chlorophyll values 100 ug/L or higher were marked as -3 SCS. These cutoffs were determined by analyzing the distribution of chlorophyll values from 2018. 95% of the values were less than 50 ug/L.

Starting with the deployment 09-26-13 copper mesh was placed around the outside of the sensor guards at Ploeg and Bayview to reduce the amount of erroneous turbidity data. The copper mesh is also employed at Gong Deep. This has led to much cleaner turbidity data. While all the data was QAQC'd as described above, the change in deployment is obvious in the data. All turbidity data at Ploeg and Bayview before 09-26-13 should be interpreted with caution. This same guard was tried at Gong Surface but without success. Turbidity data from both Gong Surface and Joe Leary (and Joe Leary Estuary) should be interpreted with caution due to numerous spikes whose origin is unknown (i.e. true event or debris).

A Sutron Sat-Link2 transmitter was installed at the Joe Leary station from 12/20/05 to 7/24/09 and transmitted data to the NOAA GOES satellite, NESDIS ID #3B004470 (Where # 3B004470 is the GOES ID for that particular station.) The same transmitter was installed at the Ploeg site on 10/7/09 and retains the NESDIS ID. A second Sutron Sat-Link2 transmitter was installed at the Bayview site on 09/02/09 and transmits data to the NOAA GOES satellite, NESDIS ID # 3B041136 (Where # 3B041136 is the GOES ID for that particular station.) The Bayview Sutron transmitter was replaced with a Storm 3 10/1/2021. The Sutron equipment from Bayview was installed at the Joe Leary Tidegate station (NESDIS ID # 3B016EB4)1/20/23. The transmissions are scheduled hourly and contain four (4) data sets reflecting fifteen-minute data sampling intervals. Upon receipt by the CDMO, the data undergoes the same automated primary QAQC process detailed in Section 2 above. The "real-time" telemetry data become part of the provisional dataset until undergoing secondary and tertiary QAQC and assimilation in the CDMO's authoritative online database. Provisional and authoritative data are available at http://cdmo.baruch.sc.edu.

5) Site location and character –

Site name	Bayview
Latitude and longitude	48º 29' 46.1" N; 122º 30' 7.61" W
Tidal range *(meters)*	2.46m (MHHW-MLLW)
Salinity range *(psu)*	15-32 psu
Type and amount of freshwater input	The salinity in Padilla Bay reflects both the sloughs that flow into the bay and the greater Puget Sound-Georgia Basin estuary in which Padilla Bay is located. Major freshwater flows into this area of the Puget Sound-Georgia Basin estuary come from the Fraser and Nooksack Rivers to the north and from the Skagit River to the south. The small Samish River discharges directly north of Padilla Bay.
Water depth (*meters, MLW*)	2.06 MLW, surveyed
Sonde distance from bottom (*meters*)	0.2m
Bottom habitat or type	Bottom sediments beneath the deployment site are fine silt and clay overlying sand.
Pollutants in area	Pollutants entering the bay include with general non-point source, agricultural non-point source, and fecal coliform bacteria from agriculture, failing septic tanks and wildlife.

Description of watershed	Most of the land in the 9300 ha Padilla Bay watershed is agricultural and is drained by four sloughs which empty into the bay through tide gates.

Site name	Gong Deep
Latitude and longitude	48º 33' 27" N; 122º 34' 21" W
Tidal range *(meters)*	2.38m (MHHW-MLLW)
Salinity range *(psu)*	24-31psu
Type and amount of freshwater input	The salinity in Padilla Bay reflects both the sloughs that flow into the bay and the greater Puget Sound-Georgia Basin estuary in which Padilla Bay is located. Major freshwater flows into this area of the Puget Sound-Georgia Basin estuary come from the Fraser and Nooksack Rivers to the north and from the Skagit River to the south. The small Samish River discharges directly north of Padilla Bay.
Water depth (*meters, MLW*)	NA
Sonde distance from bottom (*meters*)	1m
Bottom habitat or type	The bottom is composed of very soft sediment.
Pollutants in area	The only apparent pollution sources are the general sources of pollution to the Strait of Georgia and Northwest Straits.
Description of watershed	Most of the land in the 9300 ha Padilla Bay watershed is agricultural and is drained by four sloughs which empty into the bay through tide gates.

Site name	Gong Surface
Latitude and longitude	48º 33' 27" N; 122º 34' 21" W
Tidal range *(meters)*	2.4m
Salinity range *(psu)*	15-32psu
Type and amount of freshwater input	The salinity in Padilla Bay reflects both the sloughs that flow into the bay and the greater Puget Sound-Georgia Basin estuary in which Padilla Bay is located. Major freshwater flows into this area of the Puget Sound-Georgia Basin estuary come from the Fraser and Nooksack Rivers to the north and from the Skagit River to the south. The small Samish River discharges directly north of Padilla Bay.
Water depth (*meters, MLW*)	NA
Sonde distance from bottom (*meters*)	NA

Bottom habitat or type	The bottom is composed of very soft sediment.
Pollutants in area	The only apparent pollution sources are the general sources of pollution to the Strait of Georgia and Northwest Straits.
Description of watershed	Most of the land in the 9300 ha Padilla Bay watershed is agricultural and is drained by four sloughs which empty into the bay through tide gates.

Site name	Joe Leary Tidegate
Latitude and longitude	48 31' 5.41"N; 122 28' 27.07"W
Tidal range *(meters)*	2.4m
Salinity range *(psu)*	0 – 32 psu
Type and amount of freshwater input	Agricultural runoffs through the slough.
Water depth (*meters, MLW*)	NA (will be working on this in 2024)
Sonde distance from bottom (*meters*)	0.2m
Bottom habitat or type	The bottom of the slough is composed of very soft sediment.
Pollutants in area	Agricultural (livestock and crop) runoff
Description of watershed	Most of the land in the 9300 ha Padilla Bay watershed is agricultural.

Site name	Ploeg
Latitude and longitude	48º 33' 22.76" N; 122º 31' 51.22" W
Tidal range (meters)	2.4m
Salinity range (psu)	15-32 psu
Type and amount of freshwater input	The salinity in Padilla Bay reflects both the sloughs that flow into the bay and the greater Puget Sound-Georgia Basin estuary in which Padilla Bay is located. Major freshwater flows into this area of the Puget Sound-Georgia Basin estuary come from the Fraser and Nooksack Rivers to the north and from the Skagit River to the south. The small Samish River discharges directly north of Padilla Bay.
Water depth (meters, MLW)	1.62m
Sonde distance from bottom (meters)	0.50m
Bottom habitat or type	Bottom sediments beneath the deployment site are fine silt.

Pollutants in area	Pollutants entering the bay include general non-point source, agricultural non-point source, and fecal coliform bacteria from agriculture, failing septic tanks and wildlife.
Description of watershed	Most of the land in the 9300 ha Padilla Bay watershed is agricultural and is drained by four sloughs which empty into the bay through tide gates.

Station Code	SWMP Status	Station Name	Location	Active Dates	Reason Decommissioned	Notes
BY	P	Bayview Channel	48º 29' 46.1" N; 122º 30' 7.61" W	1995-current	NA	NA
BP	P	Ploeg Channel	48º 33' 22.76" N; 122º 31' 51.22" W	2001-current	NA	NA
GS	P	Gong Surface	48º 33' 27" N; 122º 34' 21" W	2003-current	NA	NA
JE	P	Joe Leary Estuary	48º 31' 08.1" N; 122º 28' 29.74" W	2009-2022	Replaced with JT	NA
JL	P	Joe Leary Slough	48º 31' 05.3" N; 122º 28' 22.8" W	1995-2010	Continual sedimentation	NA
GD	S	Gong Deep	48º 33' 27" N; 122º 34' 21" W	2016-current	NA	NA
JT	P	Joe Leary Tidegate	48 31' 5.41"N; 122 28' 27.07"W	2022-current	NA	NA

General: Padilla Bay (48º 30' N; 122º 30' W) is a shallow embayment in northern Puget Sound. The tide flats are dominated by the eelgrass *Zostera marina*, which covers approximately 3,000 ha. *Zostera japonica*, a recent introduction to the region, now covers about 350 ha of the bay. Tides are mixed semi-diurnal with a mean range of 2.4 m. Salinity varies from about 23 to 32 PSU. Padilla Bay is an "orphaned" estuary in that the Skagit River no longer empties directly into it. Most of the land in the 9300 ha Padilla Bay watershed is agricultural and is drained by four sloughs which empty into the bay through tide gates. The salinity in Padilla Bay reflects both the sloughs that flow into the bay and the greater Puget Sound-Georgia Basin estuary in which Padilla Bay is located. Major freshwater flows into this area of the Puget Sound-Georgia Basin estuary come from the Fraser and Nooksack Rivers to the north and from the Skagit River to the south. The small Samish River discharges directly north of Padilla Bay.

Joe Leary Tidegate Site (2022-Present): (48 31' 5.41"N; 122 28' 27.07"W) The Joe Leary Tidegate sonde is located on the freshwater side of a large tide gate. The tide gate a large concrete structure with 2 side-hinge gates that close when the tidal (marine) water level is higher than the freshwater water level. Marine water seeps in through the sides of the gate even when the gates are closed so that saltwater may sink and be seen at the sonde's depth. Joe Leary Slough drains land that is predominantly annual crop agriculture, pastureland, and berries with some low-density housing. The slough is characterized

by high fecal and nutrient inputs, high turbidity, and low dissolved oxygen concentrations. During the summer, there is low flow. Upstream water flows out of Joe Leary Slough when water height in Padilla Bay is lower than water height in Joe Leary Slough (i.e. ebbing tide and low water). The bottom of the slough is composed of very soft sediment, but directly below the sonde is the concrete tide gate structure that is sometimes covered with a thin layer of the soft sediment. The latitude/longitude were measured with a handheld GPS unit with an accuracy of ± 6.7m.

Joe Leary Estuary Site (2009-2022): (48° 31' 08.1" N; 122° 28' 29.74" W) The site description for the Joe Leary Estuary Site is the same as for discontinued Joe Leary Slough site (which was in existence from 12/20/00 to 6/16/09) except that Joe Leary Estuary site is located on the marine side of the tide gates that consist of 2 side-hinge manual gates (each >4 m^2) and 2 1.22 m diameter pipes with top hinge gates (these 2 big gates replaced 12 small top hinge gates August 2019). Joe Leary Slough drains land that is predominantly annual crop agriculture, pastureland, and berries with some low-density housing. The slough is characterized by high fecal and nutrient inputs, high turbidity, and low dissolved oxygen concentrations. During the summer, there is low flow. Upstream water flows out of Joe Leary Slough when water height in Padilla Bay is lower than water height in Joe Leary Slough (i.e. ebbing tide and low water). The bottom of the slough is composed of very soft sediment. This site is characterized by fully marine water ranging in salinity 23 to 32 PSU when the tide gates are closed and by water that is fully fresh (0.5 PSU) when the tide gates are open. The switch from marine to fresh water and vice versa occurs rapidly (< 1 hour) each time there is a tide change. The latitude/longitude were measured with a handheld GPS unit with an accuracy of ± 6.7m.

Bayview Channel Site (1995 – Present_: (48° 29' 46.1" N; 122° 30' 7.61" W) Bayview Channel, a major Padilla Bay tributary/distributary, floods and drains intertidal flats including eelgrass beds, mats of macroalgae, and flats without macro-vegetation. The datalogger is located in a tributary channel to Bayview Channel. The tributary drains predominately eelgrass (*Zostera marina* and *Z. japonica*) covered intertidal flats. Bottom sediments at the site in general are dominated by sand but directly below the sonde there is (because of the deployment structure) debris and small fines. Depth at this site is –1.5 m (depth below MLLW). Pollutants entering the bay include with general non-point source, agricultural non-point source, and fecal coliform bacteria from agriculture, failing septic tanks and wildlife. The latitude/longitude were measured with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m.

Ploeg Channel Site (2001 – Present): (48° 33' 22.76" N; 122° 31' 51.22" W) Ploeg Channel floods and drains intertidal flats at the north end of Padilla Bay that are comprised of intertidal flats with eelgrass beds (*Zostera marina* and *Z. japonica*) and intertidal flats without macro-vegetation in approximately equal amounts. Bottom sediments at the site in general are dominated by sand but directly below the sonde there is (because of the deployment structure) debris and small fines. Depth at this site is –1.5 m (depth below MLLW). Pollutants entering the bay include general non-point source, agricultural non-point source, and fecal coliform bacteria from agriculture, failing septic tanks and wildlife. The latitude/longitude were measured with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m.

Gong Surface Site (2003 – Present): (48° 33' 27" N; 122° 34' 21" W) The Gong surface site is located at –18 m water depth on a gradually sloping bottom (from –1 m to –75 m over 2 km) in the strait between Samish and Guemes Islands. Water in the strait flows north and south with tidal currents, the net water movement is apparently south toward the inlet to Guemes Channel. Water from the strait flows onto the intertidal flats in the northern part of Padilla Bay with each tidal cycle. Bottom sediments are mud. YSI 6600 and EXO 2 sondes are deployed near the surface at this site 0.5 m below the water surface. The only apparent pollution sources are the general sources of pollution to the Strait of Georgia and Northwest Straits. The latitude/longitude were measured with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m.

Gong Deep Site (2016 – Present): (48° 33' 27" N; 122° 34' 21" W) The Gong Deep site is located at –18 m water depth on a gradually sloping bottom (from –1 m to –75 m over 2 km) in the strait between Samish and Guemes Islands. Water in the strait flows north and south with tidal currents, the net water movement is apparently south toward the inlet to Guemes Channel. Water from the strait flows onto the intertidal flats in the northern part of Padilla Bay with each tidal cycle. Bottom sediments are mud. YSI EXO 2 sondes are deployed 1m above the bottom. The only apparent pollution sources are the general sources of pollution to the Strait of Georgia and Northwest Straits. The latitude/longitude were measured at the surface at Gong Surface with a Trimble GeoExplorer II and differentially corrected with post processing providing a manufacturer's stated accuracy of ± 5 m. Gong Deep is 50 ft due north of this measurement.

6) Data collection period

Bayview

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	roxDO Model Number	Turb Model Number	Cond Model Number	EXO Model Number
12/6/2023	11:15	1/3/2024	8:45	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
1/3/2024	9:00	2/7/2024	10:30	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01
2/7/2024	11:00	3/6/2024	10:15	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
3/6/2024	10:45	4/3/2024	8:30	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01
4/3/2024	8:45	5/2/2024	9:30	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
5/2/2024	10:00	5/7/2024	17:15	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01
5/7/2024	17:30	6/12/2024	9:15	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
6/12/2024	9:45	7/10/2024	9:30	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01
7/10/2024	9:45	8/6/2024	9:30	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
8/6/2024	9:45	9/4/2024	8:15	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01
9/4/2024	8:30	10/3/2024	8:15	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
10/3/2024	8:30	11/7/2024	9:00	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01
11/8/2024	12:30	12/11/2024	9:00	EXO2 (Jelly)	599701	599100-01	599101-01	599827	599090-01
12/11/2024	9:15	1/16/2025	10:00	EXO2 (Peanut Butter)	577602	599100-01	599101-01	599827	599090-01

Gong Deep

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	roxDO Model Number	Turb Model Number	Cond Model Number	EXO Model Number
12/20/2023	10:00	3/26/2024	11:30	EXO2 (Thing 2)	599702	599100	5991010-01	599827	599090-01
3/26/2024	11:45	6/28/2024	10:45	EXO2 (Thing 1)	577602	599100-01	599101-01	599827	599090-01
6/28/2024	11:00	10/29/2024	9:45	EXO2 (Thing 2)	599702	599100	5991010-01	599827	599090-01
10/29/2024	10:00	3/10/2025	12:30	EXO2 (Thing 1)	577602	599100-01	599101-01	599827	599090-01

Gong Surface

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	roxDO Model Number	Turb Model Number	Cond Model Number	Chloro Model Number	EXO Model Number
12/6/2023	9:45	1/3/2024	10:00	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01
1/3/2024	10:15	2/7/2024	9:15	EXO2 (Thelma)	599702	599100	5991010-01	599827	599103-01	599090-01
2/7/2024	9:30	3/6/2024	9:30	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01
3/6/2024	9:45	4/3/2024	10:00	EXO2 (Thelma)	599702	599100	5991010-01	599827	599103-01	599090-01
4/3/2024	10:15	5/2/2024	8:15	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01
5/2/2024	8:30	6/12/2020	8:00	EXO2 (Thelma)	599702	599100	5991010-01	599827	599103-01	599090-01
6/12/2024	8:15	7/10/2024	8:15	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01

7/10/2024	8:30	8/6/2024	8:00	EXO2 (Thelma)	599702	599100	5991010-01	599827	599103-01	599090-01
8/6/2024	8:30	9/4/2024	9:15	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01
9/4/2024	9:30	10/3/2024	10:00	EXO2 (Thelma)	599702	599100	5991010-01	599827	599103-01	599090-01
10/3/2024	10:15	11/7/2024	10:15	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01
11/7/2024	10:45	#########	10:00	EXO2 (Thelma)	599702	599100	5991010-01	599827	599103-01	599090-01
12/11/2024	10:30	1/16/2025	8:45	EXO2 (Shaggy)	577602	599100	5991010-01	599827	599103-01	599090-01

Joe Leary Tidegate

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	roxDO Model Number	Turb Model Number	Cond Model Number	EXO Model Number
12/6/2023	8:15	1/3/2024	12:15	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01
1/3/2024	13:30	2/7/2024	13:15	EXO2 (Chew(y)bacca)	577602	599100-01	599101-01	599827	599090-01
2/7/2024	13:30	3/6/2024	12:45	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01
3/6/2024	13:15	4/3/2024	12:15	EXO2 (Chew(y)bacca)	577602	599100-01	599101-01	599827	599090-01
4/3/2024	12:30	5/2/2024	12:30	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01
5/2/2024	12:45	6/12/2024	14:00	EXO2 (Chew(y)bacca)	577602	599100-01	599101-01	599827	599090-01
6/12/2024	14:15	7/10/2024	12:00	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01
7/11/2024	11:00	8/6/2024	12:00	EXO2 (Chew(y)bacca)	577602	599100-01	599101-01	599827	599090-01
8/6/2024	12:15	9/5/2024	12:45	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01
9/4/2024	13:00	10/3/2024	12:45	EXO2 (Chew(y)bacca)	599702	599100-01	599101-01	599827	599090-01
10/3/2024	13:00	11/8/2024	13:30	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01
11/8/2024	14:00	12/12/2024	8:15	EXO2 (Chew(y)bacca)	599702	599100-01	599101-01	599827	599090-01
12/12/2024	8:30	1/15/2025	10:30	EXO2 (Han ma Bookie)	599702	599100-01	599101-01	599827	599090-01

Ploeg

Deploy Date	Deploy Time	Retrieve Date	Retrieve Time	Sonde Model Number (Nickname)	pH Model Number	roxDO Model Number	Turb Model Number	Cond Model Number	EXO Model Number
12/6/2023	10:30	1/3/2024	9:15	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01
1/3/2024	9:45	2/7/2024	9:45	EXO2 (Gollum)	599702	599100*01	599101-01	599827	599090-01
2/7/2024	10:15	3/6/2024	9:45	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01
3/6/2024	10:00	4/3/2024	9:00	EXO2 (Gollum)	599702	599100*01	599101-01	599827	599090-01
4/3/2024	9:30	5/2/2024	8:30	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01
5/2/2024	9:00	6/12/2024	8:30	EXO2 (Gollum)	599702	599100*01	599101-01	599827	599090-01
6/12/2024	9:00	7/10/2024	8:30	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01
7/10/2024	8:45	8/6/2024	8:30	EXO2 (Gollum)	599702	599100*01	599101-01	599827	599090-01
8/6/2024	9:00	9/4/2024	10:00	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01
9/4/2024	10:15	10/3/2024	8:45	EXO2 (Gollum)	599702	599100*01	599101-01	599827	599090-01
10/3/2024	9:15	11/7/2024	9:45	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01
11/7/2024	10:00	########	9:30	EXO2 (Gollum)	599702	599100*01	599101-01	599827	599090-01
12/11/2024	10:00	1/16/2025	9:30	EXO2 (Smeagol)	599702	599100-01	599101-01	599827	599090-01

7) Distribution

NOAA retains the right to analyze, synthesize and publish summaries of the NERRS System-wide Monitoring Program data. The NERRS retains the right to be fully credited for having collected and processed the data. Following academic courtesy standards, the NERR site where the data were collected should be contacted and fully acknowledged in any subsequent publications in which any part of the data are used. The data set enclosed within this package/transmission is only as good as the quality assurance and quality control procedures outlined by the enclosed metadata reporting statement. The user bears all responsibility for its subsequent use/misuse in any further analyses or comparisons. The Federal government does not assume liability to the Recipient or third persons, nor will the Federal government reimburse or indemnify the Recipient for its liability due to any losses resulting in any way from the use of this data.

Requested citation format:
NOAA National Estuarine Research Reserve System (NERRS). System-wide Monitoring Program. Data accessed from the NOAA NERRS Centralized Data Management Office website: http://www.nerrsdata.org/; *accessed* 12 October 2023.

NERR water quality data and metadata can be obtained from the Research Coordinator at the individual NERR site (please see Principal Investigators and Contact Persons), from the Data Manager at the Centralized Data Management Office (please see personnel directory under the general information link on the CDMO home page) and online at the CDMO home page www.nerrsdata.org. Data are available in comma delimited format.

8) Associated researchers and projects–

As part of the SWMP long-term monitoring program, PDB NERR also monitors 15-minute meteorological along with monthly grab samples and diel sampling for nutrient data which may be correlated with this water quality dataset. These data are available at www.nerrsdata.org.

Outside of the required parts of the System Wide Monitoring Program the Padilla Bay NERR also collects monthly zooplankton samples and water column respiration data at Bayview, Ploeg, and Gong sites, and water quality profiles at Gong.

Annually, information on eelgrass distribution and characteristics along permanent transects are collected, as well as annual sampling as a participating member of the Multi-Agency Rocky Intertidal Network (MARINe; http://www.marine.gov/).

II. Physical Structure Descriptors

9) Sensor specifications

PDB NERR deployed EXO 2 sondes at all sites, and the sondes are configured in the same way except: GS includes a total algae sensor and GD is a medium depth sonde.

YSI EXO Sonde:

Parameter: Temperature
Units: Celsius (C)

Sensor Type: Thermistor
Model#: 599870-01
Range: -5 to 50 C
Accuracy: -5 to 35: +/- 0.01, 35 to 50: +/- .005
Resolution: 0.01 C

Parameter: Conductivity
Units: milli-Siemens per cm (mS/cm)
Sensor Type: 4-electrode cell with autoranging
Model#: 599870-01
Range: 0 to 200 mS/cm
Accuracy: 0 to 100: +/- 0.5% of reading or 0.001 mS/cm; 100 to 200: +/- 1% of reading
Resolution: 0.001 mS/cm to 0.1 mS/cm (range dependent)

Parameter: Salinity
Units: practical salinity units (psu)/parts per thousand (ppt)
Sensor Type: Calculated from conductivity and temperature
Range: 0 to 70 psu
Accuracy: +/- 1.0% of reading pr 0.1 ppt, whichever is greater
Resolution: 0.01 psu

Parameter: Dissolved Oxygen % saturation
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
Range: 0 to 500% air saturation
Accuracy: 0-200% air saturation: +/- 1% of the reading or 1% air saturation, whichever is greater 200-500% air saturation: +/- 5% or reading
Resolution: 0.1% air saturation

Parameter: Dissolved Oxygen mg/L (Calculated from % air saturation, temperature, and salinity)
Units: milligrams/Liter (mg/L)
Sensor Type: Optical probe w/ mechanical cleaning
Model#: 599100-01
Range: 0 to 50 mg/L
Accuracy: 0-20 mg/L: +/-0.1 mg/l or 1% of the reading, whichever is greater
20 to 50 mg/L: +/- 5% of the reading
Resolution: 0.01 mg/L

Parameter: Non-vented Level - Shallow
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 33 ft (10 m)
Accuracy: +/- 0.013 ft (0.004 m)
Resolution: 0.001 ft (0.001 m)

Parameter: Non-vented Level - Medium (Depth) (Gong Deep)
Units: feet or meters (ft or m)
Sensor Type: Stainless steel strain gauge
Range: 0 to 328 ft (100 m)
Accuracy: +/- 0.13 ft (0.04 m)
Resolution: 0.001 ft (0.001 m)

Parameter: pH
Units: pH units

Sensor Type: Glass combination electrode
Model#: 599701(guarded) or 599702(wiped)
Range: 0 to 14 units
Accuracy: +/- 0.01 units within +/- 10° of calibration temperature, +/- 0.02 units for entire temperature range
Resolution: 0.01 units

Parameter: Turbidity
Units: formazin nephelometric units (FNU)
Sensor Type: Optical, 90 degree scatter
Model#: 599101-01
Range: 0 to 4000 FNU
Accuracy: 0 to 999 FNU: 0.3 FNU or +/-2% of reading (whichever is greater); 1000 to 4000 FNU +/-5% of reading
Resolution: 0 to 999 FNU: 0.01 FNU, 1000 to 4000 FNU: 0.1 FNU

Parameter: Chlorophyll
Units: micrograms/Liter
Sensor Type: Optical probe
Model#: 599102-01
Range: 0 to 400 ug/Liter
Accuracy: Dependent on methodology
Resolution: 0.1 ug/L chl a, 0.1% FS

Depth qualifier:
The NERR System-Wide Monitoring Program utilizes YSI data sondes that can be equipped with either vented or non-vented depth/level sensors. Readings for both vented and non-vented sensors are automatically compensated for water density change due to variations in temperature and salinity; but for all non-vented depth measurements, changes in atmospheric pressure between calibrations appear as changes in water depth. The error is equal to approximately 1.02 cm for every 1 millibar change in atmospheric pressure, and is eliminated for vented sensors because they are vented to the atmosphere throughout the deployment time interval.

Beginning in 2006, NERR SWMP standard calibration protocol calls for all non-vented depth sensors to read 0 meters at a (local) barometric pressure of 1013.25 mb (760 mm/hg). To achieve this, each site calibrates their depth sensor with a depth offset number, which is calculated using the actual atmospheric pressure at the time of calibration and the equation provided in the SWMP calibration sheet or digital calibration log. This offset procedure standardizes each depth calibration for the entire NERR System. If accurate atmospheric pressure data are available, non-vented sensor depth measurements at any NERR can be corrected.

In 2010, the CDMO began automatically correcting Depth/Level data for changes in barometric pressure as measured by the reserve's associated meteorological station during data ingestion. These corrected Depth/Level data are reported as cDepth and cLevel, and are assigned QAQC flags and codes based on QAQC protocols. Please see sections 11 and 12 for QAQC flag and code definitions.

NOTE: older Depth data cannot be corrected without verifying that the depth offset was in place and whether a vented or non-vented depth sensor was in use. No SWMP data prior to 2006 can be corrected using this method. The following equation is used for corrected Depth/Level data provided by the CDMO beginning in 2010:
((1013-BP)*0.0102)+Depth/Level = cDepth/cLevel.

Salinity units qualifier:
In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While the 6600 series sondes report salinity in parts per thousand (ppt) units, the EXO sondes report practical

salinity units (psu). These units are essentially the same and for SWMP purposes are understood to be equivalent, however psu is considered the more appropriate designation. Moving forward the NERR System will assign psu salinity units for all data regardless of sonde type.

Turbidity qualifier:
In 2013, EXO sondes were approved for SWMP use and began to be utilized by reserves. While the 6600 series sondes report turbidity in nephelometric turbidity units (NTU), the EXO sondes use formazin nephelometric units (FNU). These units are essentially the same but indicate a difference in sensor methodology, for SWMP purposes they will be considered equivalent. Moving forward, the NERR System will use FNU/NTU as the designated units for all turbidity data regardless of sonde type. If turbidity units and sensor methodology are of concern, please see the Sensor Specifications portion of the metadata.

Chlorophyll fluorescence disclaimer:
YSI chlorophyll sensors (6025 or 599102-01) are designed to serve as a proxy for chlorophyll concentrations in the field for monitoring applications and complement traditional lab extraction methods; therefore, there are accuracy limitations associated with the data that are detailed in the YSI manual including interference from other fluorescent species, differences in calibration method, and effects of cell structure, particle size, organism type, temperature, and light on sensor measurements.

10) Coded variable definitions

Sampling station:	Sampling site code:	Station code:
Bayview Channel	BY	pdbbywq
Ploeg Channel	BP	pdbbpwq
Joe Leary Estuary	JE	pdbjewq
Joe Leary Tidegate	JT	pdbjtwq
Gong Surface	GS	pdbgswq
Gong Deep	GD	pdbgdwq

11) QAQC flag definitions –

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F_). During primary automated QAQC (performed by the CDMO), -5, -4, and -2 flags are applied automatically to indicate data that is missing and above or below sensor range. All remaining data are then flagged 0, passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

-5 Outside High Sensor Range
-4 Outside Low Sensor Range
-3 Data Rejected due to QAQC
-2 Missing Data
-1 Optional SWMP Supported Parameter
0 Data Passed Initial QAQC Checks
1 Suspect Data
2 *Open - reserved for later flag*
3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
4 Historical Data: Pre-Auto QAQC
5 Corrected Data

12) QAQC code definitions

QAQC flags provide documentation of the data and are applied to individual data points by insertion into the parameter's associated flag column (header preceded by an F_). During primary automated QAQC (performed by the CDMO), -5, -4, and -2 flags are applied automatically to indicate data that is missing and above or below sensor range. All remaining data are then flagged 0, passing initial QAQC checks. During secondary and tertiary QAQC 1, -3, and 5 flags may be used to note data as suspect, rejected due to QAQC, or corrected.

-5 Outside High Sensor Range
-4 Outside Low Sensor Range
-3 Data Rejected due to QAQC
-2 Missing Data
-1 Optional SWMP Supported Parameter
0 Data Passed Initial QAQC Checks
1 Suspect Data
2 *Open - reserved for later flag*
3 Calculated data: non-vented depth/level sensor correction for changes in barometric pressure
4 Historical Data: Pre-Auto QAQC
5 Corrected Data

12) QAQC code definitions –

QAQC codes are used in conjunction with QAQC flags to provide further documentation of the data and are also applied by insertion into the associated flag column. There are three (3) different code categories, general, sensor, and comment. General errors document general problems with the deployment or YSI datasonde, sensor errors are sensor specific, and comment codes are used to further document conditions or a problem with the data. Only one general or sensor error and one comment code can be applied to a particular data point, but some comment codes (marked with an * below) can be applied to the entire record in the F_Record column.

General Errors

GIC	No instrument deployed due to ice
GIM	Instrument malfunction
GIT	Instrument recording error; recovered telemetry data
GMC	No instrument deployed due to maintenance/calibration
GNF	Deployment tube clogged / no flow
GOW	Out of water event
GPF	Power failure / low battery
GQR	Data rejected due to QA/QC checks
GSM	See metadata

Corrected Depth/Level Data Codes

GCC	Calculated with data that were corrected during QA/QC
GCM	Calculated value could not be determined due to missing data
GCR	Calculated value could not be determined due to rejected data
GCS	Calculated value suspect due to questionable data
GCU	Calculated value could not be determined due to unavailable data

Sensor Errors

SBO	Blocked optic
SCF	Conductivity sensor failure
SCS	Chlorophyll spike
SDF	Depth port frozen
SDG	Suspect due to sensor diagnostics
SDO	DO suspect
SDP	DO membrane puncture
SIC	Incorrect calibration / contaminated standard

SNV	Negative value
SOW	Sensor out of water
SPC	Post calibration out of range
SQR	Data rejected due to QAQC checks
SSD	Sensor drift
SSM	Sensor malfunction
SSR	Sensor removed / not deployed
STF	Catastrophic temperature sensor failure
STS	Turbidity spike
SWM	Wiper malfunction / loss

Comments

CAB*	Algal bloom
CAF	Acceptable calibration/accuracy error of sensor
CAP	Depth sensor in water, affected by atmospheric pressure
CBF	Biofouling
CCU	Cause unknown
CDA*	DO hypoxia (<3 mg/L)
CDB*	Disturbed bottom
CDF	Data appear to fit conditions
CFK*	Fish kill
CIP*	Surface ice present at sample station
CLT*	Low tide
CMC*	In field maintenance/cleaning
CMD*	Mud in probe guard
CND	New deployment begins
CRE*	Significant rain event
CSM*	See metadata
CTS	Turbidity spike
CVT*	Possible vandalism/tampering
CWD*	Data collected at wrong depth
CWE*	Significant weather event

13) Post deployment information

Bayview

Deploy Date	Sonde Nickname	SpCond (50.0)	ROXDO1	ROXDO2	pH7	pH10	Turb (0.0)	Turb (124.0)	Depth
12/6/2024	Jelly	50.08	100.40	101.26	7.05	10.07	0.16	121.50	0.121(0.131)
1/3/2024	Peanut Butter	49.66	100.90	100.99	7.01	10.04	0.28	124.34	0.101(0.103)
2/7/2024	Jelly	49.99	104.40	101.83	6.97	10.05	0.22	124.75	0.169(0.189)
3/6/2024	Peanut Butter	49.93	101.30	100.46	7.03	10.09	0.00	123.97	0.042(0.048)
4/3/2024	Jelly	50.12	100.40	100.76	7.05	10.07	0.16	124.22	0.087(0.079)
5/2/2024	Peanut Butter	50.06	101.80	102.53	7.06	10.05	No probe deployed		0.241(0.262)
5/7/2024	Jelly	49.76	101.00	101.39	7.08	9.99	0.67	125.42	0.135(0.145)
6/12/2024	Peanut Butter	49.74	97.20	101.60	6.97	9.99	0.36	122.55	0.149(0.165)
7/10/2024	Jelly	50.13	100.90	101.73	6.96	10.01	0.68	124.25	0.163(0.179)
8/6/2024	Peanut Butter	49.90	100.10	101.26	7.01	10.03	0.37	124.28	0.137(0.131)
9/4/2024	Jelly	49.80	100.70	100.19	6.97	10.01	0.39	122.84	0.048(0.02)

10/3/2024	Peanut Butter	49.92	100.60	101.46	6.99	9.99	0.13	115.80	0.16(0.152)
11/8/2024	Jelly	50.10	101.00	100.29	6.99	10.04	0.73	122.31	0.071(0.031)
12/11/2024	Peanut Butter	49.95	101.40	101.73	6.92	9.96	-0.33	126.31	0.194(0.179)

Gong Surface

Deploy Date	Sonde Nickname	SpCond (50.0)	ROXDO1	ROXDO2	pH7	pH10	Turb (0.0)	Turb (124.0)	Depth	CHL(0)	CHL
12/6/2023	Shaggy	50.05	101.50	101.26	7.01	10.02	0.05	121.87	0.120(0.131)	0.01	68.30
1/3/2024	Thelma	49.93	101.30	100.99	7.08	10.13	0.40	124.64	0.110(0.103)	0.07	71.25
2/7/2024	Shaggy	49.91	102.00	101.83	7.01	10.06	0.37	124.42	0.182(0.189)	0.03	68.53
3/6/2024	Thelma	49.74	108.10	100.46	7.03	10.07	0.31	123.94	0.040(0.048)	0.06	67.58
4/3/2024	Shaggy	50.02	100.30	100.66	7.01	10.03	0.31	123.00	0.079(0.069)	0.23	67.38
5/2/2024	Thelma	49.69	104.00	101.39	7.04	10.05	0.79	123.67	0.142(0.145)	0.37	66.77
6/12/2024	Shaggy	49.69	98.40	101.63	7.00	10.00	0.41	124.77	0.149(0.169)	0.09	66.59
7/10/2024	Thelma	49.94	101.70	101.73	7.03	10.06	0.27	126.54	0.151(0.179)	0.27	67.72
8/6/2024	Shaggy	49.55	99.90	101.26	7.00	9.97	0.68	125.19	0.123(0.131)	0.71	65.03
9/4/2024	Thelma	49.89	100.30	100.46	7.00	10.03	0.40	122.93	0.061(0.048)	0.37	69.11
10/3/2024	Shaggy	49.93	100.50	101.47	7.00	9.95	0.08	117.21	0.151(0.152)	0.46	69.61
11/7/2024	Thelma	50.13	100.80	100.29	7.01	10.06	0.80	123.57	0.074(0.031)	0.73	65.35
12/11/2024	Shaggy	49.78	102.20	101.73	6.98	9.98	-0.13	126.38	0.189(0.179)	0.15	67.33

Gong Deep

Deploy Date	Sonde Nickname	SpCond (50.00)	ROXDO1	ROXDO2	pH7	pH10	Turb (0.0)	Turb (124.0)	Depth
12/20/2023	Thing 2	50.01	102.40	100.93	9.73	12.37	-0.16	123.81	0.080 (0.096)
3/26/2024	Thing 1	49.82	116.80	101.16	7.03	10.06	0.05	125.76	0.106(0.12)
6/28/2024	Thing 2	50.10	101.60	100.06	7.02	10.05	0.10	117.63	0.027(0.006)
10/29/2024	Thing 1	49.99	106.70	99.89	7.02	10.08	0.06	123.61	-0.014(-0.011)

Joe Leary Tidegate

Deploy Date	Sonde Nickname	SpCond (50.0)	ROXDO1	ROXDO2	pH7	pH10	Turb (0.0)	Turb (124.0)	Depth
12/6/2023	Han ma Bookie	50.07	101.00	101.26	7.08	10.08	0.78	121.99	0.122(0.131)
1/3/2024	Chew(y)bacca	49.77	100.40	101.03	7.08	10.12	0.78	124.20	0.098(0.107)
2/7/2024	Han ma Bookie	49.54	101.50	101.83	7.03	10.07	0.85	124.75	0.177(0.189)
3/6/2024	Chew(y)bacca	49.43	100.30	100.46	7.05	10.04	0.20	121.74	0.039(0.048)
4/3/2024	Han ma Bookie	49.85	100.10	100.60	7.04	10.08	0.81	125.72	0.074(0.069)
5/2/2024	Chew(y)bacca	49.07	99.60	101.39	8.37	10.97	0.90	126.21	0.111(0.145)
6/12/2024	Han ma Bookie	49.56	98.90	101.60	7.03	10.03	0.76	125.29	0.151(0.169)
7/11/2024	Chew(y)bacca	50.01	100.80	101.73	6.98	10.03	0.81	122.25	0.157(0.179)
8/6/2024	Han ma Bookie	49.80	95.30	101.26	7.03	9.98	0.83	119.96	0.129(0.131)

9/4/2024	Chew(y)bacca	49.93	99.30	100.19	7.03	10.05	0.31	117.06	0.058(0.020)
10/3/2024	Han ma Bookie	49.96	97.70	101.03	6.95	9.93	0.45	113.11	0.121(0.107)
11/8/2024	Chew(y)bacca	50.33	99.20	100.29	6.92	9.98	2.47	114.76	0.054(0.031)
12/12/2024	Han ma Bookie	49.64	100.70	102.20	7.02	10.04	8.85	111.28	0.218(0.227)

Ploeg

Deploy Date	Sonde Nickname	SpCond (50.0)	ROXDO1	ROXDO2	pH7	pH10	Turb (0.0)	Turb (124.0)	Depth
12/6/2023	Smeagol	50.13	101.20	101.26	7.00	9.99	0.06	121.90	0.115(0.131)
1/3/2024	Gollum	50.03	101.00	100.99	6.98	10.06	0.12	124.89	0.100(0.103)
2/7/2024	Smeagol	49.90	101.50	101.83	7.00	10.02	0.38	123.99	0.172(0.189)
3/6/2024	Gollum	49.69	100.40	100.46	6.95	10.00	0.17	124.70	0.032(0.048)
4/3/2024	Smeagol	49.97	99.70	100.76	7.01	10.05	0.33	124.16	0.083(0.079)
5/2/2024	Gollum	49.77	100.50	101.39	6.95	9.95	0.52	120.04	0.150(0.145)
6/12/2024	Smeagol	49.58	99.80	101.60	7.01	10.00	1.00	126.35	0.152(0.165)
7/10/2024	Gollum	50.19	101.00	101.70	6.97	9.99	0.63	123.49	0.160(0.179)
8/6/2024	Smeagol	49.67	101.40	101.26	6.96	9.97	0.39	124.48	0.138(0.131)
9/4/2024	Gollum	49.92	100.30	100.19	6.94	9.95	0.21	122.19	0.040(0.020)
10/3/2024	Smeagol	49.94	100.70	101.50	6.90	9.91	0.11	115.88	0.154(0.158)
11/7/2024	Gollum	50.18	100.80	100.29	6.97	10.03	0.46	123.90	0.072(0.031)
12/11/2024	Smeagol	49.91	102.40	101.70	6.92	9.92	-0.29	122.64	0.198(0.179)

14) Other remarks/notes –

Data are missing due to equipment or associated specific probes not being deployed, equipment failure, time of maintenance or calibration of equipment, or repair/replacement of a sampling station platform. Any NANs in the dataset stand for "not a number" and are the result of low power, disconnected wires, or out of range readings. If additional information on missing data is needed, contact the Research Coordinator at the reserve submitting the data.

Bayview

This site collects large mats of kelp, algae, and detrital eelgrass which wrap around the sonde housing structure and pile. Only the dissolved oxygen (and pH in some cases) appears to be affected and particularly during high high, high low, and low highs of spring tides when there is lower water flow around the site. It is not known the overall contribution of this problem versus normal draw down of oxygen by primary producer respiration. While all attempts to monitor and remove the mats are made, this should be taken into account when interpreting the spring and summer dissolved oxygen data. Any erroneous data from this problem will be marked as suspected or rejected and CSM, and any data within the same deployment as the marked data should be interpreted with caution. Some or all of the data from the following deployments are marked as noted: 12/6/23, 1/3/24 (additionally there was an intermittent malfunction with the DO probe), 2/7/24 (this includes some negative values), 3/6/24, 7/10/24, 8/6/24, 11/8/24, 12/11/24

The deployment beginning 5/2/24 is missing turbidity data. There was a problem with the firmware upgrade and the sensor could not be installed until the problem was resolved.

The turbidity data for the deployment beginning 8/6/24 was marked as suspect because there is an obvious increase from the previous and following deployments, however, the calibration and post-deployment checks were valid and so the cause is small and unknown.

Gong Deep

The time for the deployment beginning 10/29/2024 was set one hour forward. Times and dates were adjusted to reflect Pacific standard time.

Gong Surface

On 6/28/24 the sonde was removed for cleaning and maintenance. When the sonde was replaced, it did not seat correctly and data was collected at the wrong depth. The depth data has been rejected; however, all other data has been retained. The site occasionally stratifies but below the depth the sonde normally sits and data before and after this deployment match up.

Joe Leary Tidegate

During the deployment beginning 8/6/24 some temperature records are missing. The other parameters collected at these times do not seem to reflect a temperature sensor problem. Instead, the missing temperatures could be from the fact that the data has been recovered from telemetry data.

Ploeg

This site collects large mats of kelp and algae, and detrital eelgrass which wrap around the sonde housing structure and pile. Only the dissolved oxygen (and pH in some cases) appears to be affected and particularly during high high, high low, and low highs of spring tides when there is lower water flow around the site. It is not known the overall contribution of this problem versus normal draw down of oxygen by primary producer respiration. While all attempts to monitor and remove the mats are made, this should be taken into account when interpreting the spring and summer dissolved oxygen data. Any erroneous data from this problem will be marked as suspected or rejected and CSM, and any data within the same deployment as the marked data should be interpreted with caution. Some or all of the data from the following deployments are marked as noted:

Deployments beginning: 1/3/24, 4/3/24, 5/2/24, 7/10/24, 9/4/24